

## WEATHER IN THE UNITED STATES

## THE WEATHER ELEMENTS

(Climatological Division, Oliver L. Fassig in Charge)

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## GENERAL SUMMARY

\* In practically all sections July was hotter than normal. The heat was comparatively steady in the majority of States, though several north-central stations set new high-temperature marks during the closing week. As a whole, the month was the hottest July ever recorded in most of the far Southwest and in portions of the Atlantic States; but the central area, while showing a large excess, failed to equal its earlier record.

The rainfall was irregular as to distribution, even within comparatively small areas. Usually there was more than normal from the Carolinas northward and northeastward, and along the Canadian boundary from Minnesota to Montana. Near the central and west Gulf coast there were some districts where marked shortages occurred, but amounts above normal were the rule, and several areas received quantities twice or thrice as great as normal. Deficient precipitation was the prevailing condition in the heart of the country and west of the Rocky Mountains. Most reports indicate numerous thunderstorms, abundant sunshine, and low relative humidity.

## TEMPERATURE

The opening week of July was mainly hotter than normal, especially in the Lake region and the southeastern portion of the country, but about the 3d cool weather set in over the Missouri Valley, continuing until the 9th. After several days with temperature conditions showing no notable departures, high temperatures set in about the 14th to 16th over the Missouri and upper Mississippi Valleys and the Lake region, continuing without noteworthy break for the remainder of the month. The final decade was marked by considerable excess of temperature in the western and central thirds of the country and in the Northeast.

As a whole, July was at least as hot as normal in every State. In California and the Plateau region the month averaged about 5° to 7° hotter than normal, many stations in California and the western portions of Arizona and Nevada reporting it the hottest month of record. The departures of the mean temperature from the normal are shown on Chart I. As may be seen from that chart in the middle Rocky Mountain region and the middle and lower portions of the Missouri Valley, and thence eastward almost to the Atlantic coast, the month averaged usually 2° to 6° hotter than normal, and there was a like excess in the southern Appalachian region, where several stations noted that the mean temperature was higher than ever before in July.

In the lower Mississippi Valley the month was practically normal in its average temperature, and the same was true of Texas as a whole, but western and southwestern Texas averaged more than 1° cooler than normal.

Except in New England and Delaware, temperatures exceeding 100° were noted in every State. In Missouri, Minnesota, and Kansas, also all northern States from Nebraska and the Dakotas westward, and all Plateau and Pacific States there were readings of 110° or higher. The very highest temperature reported was 126° in southeastern California, while east of the Rocky Mountains 116° was noted at Redfield, S. Dak. The various States noted their highest temperatures usually during the first five days or between the 20th and the 29th.

The lowest temperature marks of the States were frequently in the 40's, but were higher in the Gulf and some of the least mountainous Atlantic States, while lower in the upper Lakes States, the northern Plains, the Rocky Mountain States, and the far West. The very lowest reported was 20° at three elevated stations in Colorado. The various low marks were noted chiefly between the 5th and the 12th.

## PRECIPITATION

The inset on Chart V shows the departure of precipitation from normal.

The opening week of July brought much needed rains in many portions, especially Montana, North Dakota, the middle Plains, and from the central valleys eastward to the Carolina and Virginia coast. The succeeding week was mainly less rainy, but considerable parts of North Dakota, the upper Mississippi Valley, the southern Plains, and the Atlantic States had ample rainfall. Nearly all the Gulf coast districts received liberal amounts during the third week, as did the western half of the cotton region and the majority of States from Tennessee and North Carolina northward and northeastward. The final decade was marked by absence of substantial rains in most of the lower Missouri and upper Mississippi Valleys, and near Lakes Michigan and Superior; but, on the other hand, large parts of Arkansas, Mississippi, and Georgia, and of the upper Ohio Valley and northern New York and New England had abundant rains, and the last few days saw much rainfall over the Rocky Mountain and eastern Plateau regions, several portions of the Plains, and the west Gulf coast region.

The precipitation of July, as a whole, was comparatively well distributed and rather near to normal, for a summer month, this situation being more favorable than in almost any preceding summer month for several years. This was particularly true of the States which are situated east of the Plains, and wholly or largely south of the fortieth parallel of latitude, every one of these averaging at least 3 inches of rainfall and all save two having fully two-thirds of an inch at the stations reporting the least amounts. Mississippi received, on the average, almost 9 inches, and that State, with western Alabama and eastern Arkansas, had much greater rainfall than normal. Rainfall slightly above normal was the rule from the southern Appalachians and eastern South Carolina northward and northeastward, save that eastern New Jersey and southern New England fell short of normal. Usually there was more than normal from central Montana eastward over North Dakota to northwestern Minnesota, also from Montana southward to eastern Arizona, and in the central and southern portions of Texas.

There was usually considerably less rain than normal in the eastern portions of Florida and Georgia, the lower Ohio Valley, northern Ohio and adjacent parts of Michigan and Indiana, and southeastern Kansas and central Oklahoma. While there was considerable irregularity as to quantities received, there was mainly a decided shortage from northeastern Missouri northward to the vicinity of western Lake Superior and northwestward to beyond the Black Hills. The southwestern Plains and the eastern and central parts of New Mexico had moderate shortages, likewise southwestern Arizona, and practically all of Nevada, central and western Idaho, and the Pacific Northwest.

In Montana, as a whole, this was the first month to show more precipitation than normal since October, 1930; in Alabama and Mississippi, since November; and

in Oklahoma, Texas, and Arkansas, since March of the present year.

The largest monthly amount reported by any one station in the United States proper was 25.10 inches at Seven Hills, in Mobile County, Ala.

#### SUNSHINE AND RELATIVE HUMIDITY

The sunshine was of more than usual quantity during July in nearly all sections, even in most areas where the precipitation was heavy. The amount of sunshine was particularly large in the far Northwest and the upper

Mississippi Valley; elsewhere it was usually equal to or moderately more than normal, but some portions of the central and eastern Lake region, the Ohio Valley and the Rio Grande Valley had less sunshine than normal.

The relative humidity was above normal in much of the Middle Atlantic and New England area, and often near the east Gulf coast and near the Rio Grande. Practically all other districts had less humidity than normal, the shortage being large in the middle and northern portions of the Plateau and Rocky Mountain regions, in most of the Plains and in the upper Mississippi Valley.

#### SEVERE LOCAL STORMS, JULY, 1931

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path, yards <sup>1</sup>	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Fort Wayne, Ind.	1	12:25 p. m.			\$1,700	Thunderstorm	Power lines damaged; traffic delayed; large building of lumber company blown down; windows broken.	Official U. S. Weather Bureau.
Goff (near), Kans.	1	12:30 p. m.	1,500		4,000	Tornado	Chief damage to large barn and small farm buildings; livestock killed or injured; path 1 mile long.	Do.
Indianapolis (near), Ind.	1	1 p. m.				do	Occurred near airport, no damage reported.	Do.
Darlington, Wis., and vicinity.	1	5:30 p. m.	880		25,000	do	Character of damage not reported.	Do.
Port Arthur, Tex.	1	6 p. m.		1	73,000	Thunderstorm	Lightning caused explosion and fire on oil barge.	Do.
Bradford, Cumberland, Lancaster, Lebanon, and Dauphin Counties, Pa.	1	P. m.			300,000	Severe thunderstorm, wind and hail.	Many houses unroofed; heavy crop damage.	Do.
Boone and Grundy Counties, Iowa.	1	P. m.			17,000	Wind and hail	Buildings and crops damaged.	Do.
Tony (near), Wis.	1	P. m.			8,000	Tornado	Large barn destroyed and another damaged.	Do.
Audubon, Black Hawk, Bremer, Carroll, Cerro Gordo, Clay, Greene, Guthrie, Hamilton, Hancock, Harrison, Kossuth, and Marion Counties, Iowa.	1					Wind	Crops flattened; buildings damaged; a few poles blown down.	Do.
Beattie, Kans.	1				500	Probably tornado.	Barns and fruit trees damaged.	Do.
Indianapolis, Ind.	1					Thunderstorm	2 houses struck by lightning; number of power and light poles damaged or blown down.	Do.
Marshall and Pocahontas Counties, Iowa.	1				55,000	Hail	Chief damage to crops.	Do.
Maryland (central and western).	1					Wind	Trees blown down or broken off; buildings damaged.	Do.
Mounds, Ill.	1					do	Plate glass windows broken; trees, roofs, and small buildings damaged.	Do.
Pratt County, Kans.	1				50,000	do	Wheat badly twisted and blown down; minor damage to buildings.	Do.
Beckemeyer and Posey, Ill.	2	4 p. m.	4 mi.			do	Homes, outbuildings, and trees damaged; crops injured; path 10 miles long.	Do.
Buffalo, N. Y., and vicinity.	2				36,000	do	Buildings, hangar, and 5 planes damaged.	Do.
Memphis, Tenn., and vicinity.	2				85,000	Thunderstorm	Schoolhouse and business building severely damaged.	Do.
Spearville (near), Kans.	2				5,000	Hail	Character of damage not reported; area about 5 square miles.	Do.
Tama County, Iowa.	2				3,000	Wind	Barns and other small buildings damaged.	Do.
Grand Junction, Colo.	3	5:04 - 5:13 p. m.	2 mi.		15,000	Hail	Damage chiefly to apples, melons, and tomatoes.	Do.
Sanders County, Mont.	3				1,500	do	Roofs, auto tops, etc., damaged.	Do.
Wilson, Hazen, and Slovaktown, Ark.	3				20,000	Wind	Character of damage not reported.	Do.
Brown and Jackson Counties, Kans.	4	2:30-3 p. m.	3 mi.		20,000	Hail	Details not reported; path 10 miles long.	Do.
Barber, Harper, Sumner, Kingman, and Sedgwick Counties, Kans.	4	2:30 - 3:30 p. m.				Wind	Chief damage at airport at Wichita; path 80 miles long.	Do.
Rogers, Ark., and vicinity.	7				15,000	Hail	Character of damage not reported.	Do.
Hamilton, Webster, and Dubuque Counties, Iowa.	8	2:30-3 p. m.			48,000	Hail and wind	Considerable damage to buildings and crops.	Do.
Tyrone (near), Okla.	8	5 p. m.	1-2 mi.		25,000	Hail	Damage mainly to crops; path 4 miles long.	Do.
Cooke, Grayson, Collin, and Fannin Counties, Tex.	8	P. m.			3,800	Wind	Buildings unroofed; crops hurt.	Do.
Lyon and Story Counties, Iowa.	8	P. m.			40,000	Hail	Considerable crop loss.	Do.
Albuquerque, N. Mex. (10 miles east).	9	12:15 p. m.				Probably tornado.	No details reported.	Do.
Alliance, Nebr.	9	2-3 p. m.	4 mi.		60,000	Hail	Considerable damage to crops and some loss of livestock; path 5 miles long.	Do.
Jonesville, Va.	9	3:30 p. m.	1.5 mi.		12,000	Hail and rain	Crops hurt; soil washed; buildings and bridges damaged.	Do.
Benton, Buchanan, Delaware, Dubuque, Franklin, Johnson, Linn, Mitchell, Polk, and Tama Counties, Iowa.	9				156,000	Hail	Crops total loss in some places; poultry killed.	Do.
Pennsylvania (north central and northeastern).	9					Rain and electrical.	Cellars flooded; bridges washed away; heavy crop loss.	Do.
Waukesha County, Wis.	10				5,000	do	Considerable damage, chiefly to crops.	Do.
Belleville to Cuba, Kans.	11	5 p. m.	2 mi.		8,000	Hail and wind	Trees broken; small buildings, poles, and wires blown down; path 4 miles.	Concordia (Kans.). Blade Empire

<sup>1</sup> "Mi." signifies miles instead of yards.